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Crew prepares for third Hubble servicing mission

By Kyle Herring

Has it been three years already?

Seems that's about the right interval between trips to probably the most famous telescope in the world, named after one of the most respected astronomers – Edwin P. Hubble.

The telescope bearing Hubble's name is due for a 400-million-mile checkup next month, albeit earlier than originally planned in order to change the observatory's six gyroscopes that have proven quite finicky over the course of its on-orbit life.

The Hubble Space Telescope continues to amaze, enlighten and spark the imagination of people around the world with almost every observation. Three of its six gyros have failed, prompting the team to call for an earlier-than-planned visit to change all six and perform some other tasks scheduled for the normal servicing call that was planned next year.

With this earlier house call, the third servicing mission has been split into two – servicing missions 3A and 3B. The next visit will wait until 2001 with the successful restoration to full redundancy of all gyroscopes.

As with the two previous servicing calls, four space walkers will form two teams to tackle the tasks during four excursions outside after the observatory is safely captured by the robot arm and secured atop its familiar work platform in *Discovery's* payload bay.

Air Force Col. Curt Brown, no stranger to space flight, will lead the STS-103 mission. He is preparing to head into orbit for a U.S. record-tying sixth time – third as commander.

"I am very honored and very excited about being part of the Hubble mission," he said. "There's a lot of folks up at Goddard that do a tremendous amount of work... so I'm very excited to be a part of that team and I'm hoping that we can go up and...bring Hubble back to A-1 condition."

NASA's Goddard Space Flight Center in Greenbelt, MD, oversees the telescope's operation and maintenance and has tested all of the equipment to be installed in, and on, Hubble during the scheduled 10-day flight set to launch in the pre-dawn hours of December 6.

Launch is timed to occur as the telescope flies within range of the Kennedy Space Center, FL. Two days later, Brown will fly *Discovery* in for a manual approach to within 35 feet – just enough to allow Jean-François Clervoy to reach it with the robot arm.

Clervoy, calling this role the "summit" of the mission for him personally, has big shoes to fill on this task. He follows his fellow European Space Agency astronaut Claude Nicollier, now one of the four space walkers, and Steve Hawley, the premier arm operator when it comes to Hubble.

The shuttle's cockpit will be a busy one during the rendezvous phase. While Brown and Clervoy float side-by-side at the aft windows – Brown flying the shuttle and Clervoy poised with the arm – pilot Scott Kelly (Navy Lieutenant Commander) will be sitting in the commander's seat watching over orbiter systems and computer commands. Steve Smith will be next to him inputting commands, as necessary, to the telescope. John Grunsfeld will be taking precise distance measurements with a laser while Mike Foale oversees photography and television operations.

Once the telescope is firmly in the grasp of the arm, it will be lowered onto the Flight Support System in the back of the payload bay where it will stay for the next six days.

During that time, four space walkers will perform four excursions outside in teams of two as has been the procedure for the previous servicing missions. Alternating the space

walks will be Smith, payload commander and veteran of the previous trip to Hubble in 1997, and Grunsfeld. The two will perform the first and third extravehicular activities (EVA). Foale and Nicollier will tackle the second and fourth space walks.

As with previous missions, the astronauts will be distinguishable by the markings on their extravehicular mobility units (EMUs), or spacesuits. Smith will have a solid red stripe on the upper portion of his suit. Grunsfeld will have an all-white suit. Foale will have a broken red stripe and Nicollier will wear a suit with a diagonal broken red stripe.

Also as before, all tasks are prioritized to maximize the time available to complete all scheduled activities. But each astronaut is completely cross-trained in each task in the event that one is moved to a different day.

Smith performed three space walks on the '97 mission and is the payload commander on this flight. He remembers vividly seeing Hubble as it grew larger in the shuttle's overhead windows during the rendezvous.

"As it got closer and closer, the arrays, which are gold, really kind of sparkled and I'd always heard that once you see Hubble, you'll never forget it. It really is this magical looking spaceship, and it really is just a spectacular sight to see," said Smith.

Once captured and safely affixed to its support structure, Hubble will get its electrical power from *Discovery* for the duration of its stay in the payload bay.

The next day, Smith and Grunsfeld will change the three Rate Sensor Units housing the six gyroscopes. Other tasks on the first space walk include opening some valves on the Near Infrared Camera and Multi-Object Spectrometer to ensure its nitrogen system is fully depleted. The system will be repaired on the next visit and this short task will help that future activity. The final scheduled task for EVA day one will be to install six small voltage regulators to protect the telescope's aging batteries from overheating.

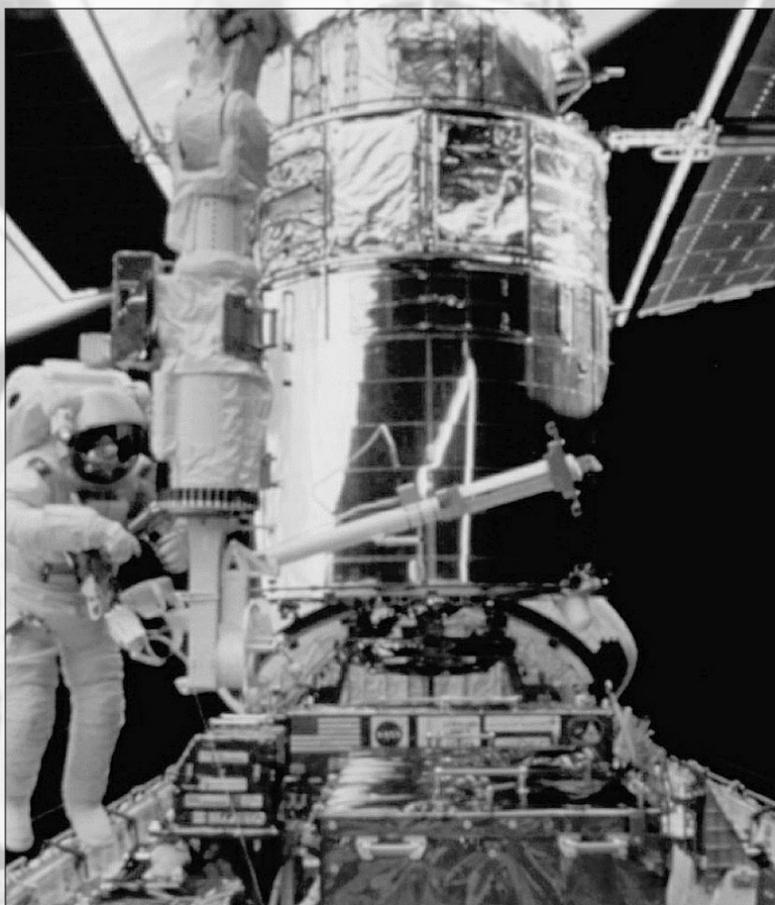
Grunsfeld says his path to this point seems to have been fate. He studied astronomy and physics at MIT, then moved on to the University of Chicago where Edwin Hubble received his Ph.D., and then on to the California Institute of Technology where Hubble went after the University of Chicago. Heading to the Mount Palomar Observatory to work on instruments and make observations as Hubble did led Grunsfeld to the realization that "this is a mission I'd been training for nearly all my life. It's absolutely a dream come true [and I] couldn't imagine anything more fulfilling for an astronomer, but also for me personally... than being on this Hubble mission."

As with previous missions, the EVA 1 and 3 crew will take a day off while the 2 and 4 crew heads outside.

Foale and Nicollier will team on EVA day two. They will install a new computer in the telescope and then change out one of the Fine Guidance Sensors. This task will be quite familiar to most observers since an identical task was performed on the last HST mission. The FGS is a pie-shaped instrument weighing about 500 pounds. It locks on stars to hold the telescope in a precise position for long periods while other scientific instruments are conducting observations. It has been refurbished and upgraded from the '97 mission.

"Hubble is like the gem payload of NASA," Foale says. "It's produced some of the most startling visual images ever.... It's putting out these fantastically high quality images that captivate the rest of the world."

Please see **HUBBLE**, Page 2



JSC and CCISD celebrate SciAd kickoff.

Page 3



Camera brings HDTV images from space.

Page 4 - 5



JSC Child Care Center goes trick or treating.

Page 6

New Operations Control Center added to Space Vehicle Mockup Facility

The Space Vehicle Mockup Facility located in Bldg. 9N serves a variety of JSC customers. Housed in the SVMF are nineteen station module mockups and three shuttle mockups, along with several miscellaneous trainers.

In an effort to better serve the center needs, facility operations contractor Johnson Engineering developed the Operations Control Center in collaboration with the EVA, Robotics, and Crew Systems Division's SVMF Office to serve as the central point of contact for anyone working in or visiting the SVMF. The OCC maintains overall cognizance of all personnel and activities in the facility, with the knowledge to supply data to any internal and external customers. Other OCC functions include metrics generation and reporting, short-term activity scheduling, discrepancy report collection, daily status report generation, safety and management notification.

After or during the tour or training, customers should report any discrepancies, close calls, mishaps, and tour or training results to the OCC. The OCC needs this

data for the appropriate actions to be taken, and to be added to its daily status report.

John Sims, chief of the SVMF Office, commented that, "The OCC has proven to be a valuable asset to NASA management. Having the OCC as the center point

of contact reduces scheduling, training, maintenance, and tour conflicts. It also provides a focal point for our facility users for information and support."

In addition to daily training activities, the SVMF supports a large number of

official, VIP and other tours every week. These are in addition to the numerous Space Center Houston daily tours. Les Holt, Johnson Engineering OCC supervisor, said, "The OCC has kept tours and tourists from impacting instructor and crew training classes and maintenance activities. This new effort has greatly increased the efficiency of the SVMF. Maintaining safety for both the JSC employees and visitors is OCC's primary concern."

Whenever you visit the SVMF, the first step is to check in with the OCC. They will greet you with a smile, a professional attitude, and a list of "do's and don'ts" for the facility. Please remember that all people in the facility must be badged. If you are conducting a tour, everyone in the party must be badged either through Bldg. 110 or with a visitor's badge from your division office. ■



ASA JSC Photo S99-12820 by Bill Stafford

The Operations Control Center Team, from left, front: Jill Fritz, Joanne Strickland, Jesse Zamarron; back: Frank Martinez, Kimberley Butler, Pam Pottorff. Not pictured: Frances Gossett, Marisela Smith, Ted Yancy.



Baikonur – *only a phone call away*

By Carlos Fontanot

Since the late 1950s, Baikonur has been the prime launch site for Moscow's space program. Located in the nation of Kazakhstan in Central Asia, the Baikonur Cosmodrome also serves as the main launch site for commercial space enterprises and key International Space Station elements such as the Zarya base block, the soon-to-be-launched Zvezda Service Module, and Soyuz/Progress vehicles.

On October 16 in a small ceremony, NASA opened an office at Baikonur to better support ISS cargo integration and Service Module pre-flight activities. The new office is just down the hall from the high bay where Service Module integration work is currently in progress. It consists of a conference room and an office with four desks, office furniture, three PC stations, direct NISN phone and fax lines to Moscow and the USA, and a Moscow phone line.

The 50-square-meter office space is a great improvement for visiting NASA personnel traveling to the cosmodrome. In the past, employees had to find a chair or

a place to sit down and work, there were no phones available other than cell phones that did not always work, and fax capability was not available. Today, there are data lines for e-mail and other real-time communications with NASA offices in Moscow and the USA.

"Our new office will be a learning center for our personnel," said Dave Lengyel, Moscow Technical Liaison Office manager, who is responsible for coordinating the flight integration operation in Baikonur and has arranged at least ten trips to the cosmodrome since June of this year. "We have a lot of work to do in preparation for a very busy flight schedule and a lot to learn from our Russian colleagues in Baikonur," he said, pointing out that the new office will improve the work flow and communications, especially over the next year when the Service Module, several Progress supply vehicles and the Expedition One crew will be launched from the cosmodrome.

The idea to establish an office in Baikonur came during the Phase One lessons learned process. It became imminent that a NASA presence at the flight integration site was required

when the Service Module left Moscow via rail car on May 13 and was transported to Baikonur. Working with the Service Module Launch Package Manager, Gordon Ducote, ISS officers in Houston and Moscow went to work and completed contract negotiations with Russian counterparts earlier this year to establish the office. The agreement became an official part of the Joint Program Review protocol signed in April. "At the beginning, the project seemed simple enough, but soon it turned incredibly complicated, due to the high security requirements and stringent customs regulations to import computers and communications equipment to Baikonur," said Lee Pagel, MTLO business manager, in particular the procurement and customs aspects, with Russian and Kazak officials. It took close to nine months before

everything was in place to open the office. NASA expects to provide the Russian Space and Aeronautics Agency with similar office space at KSC.

When NASA and contractor personnel in Baikonur go to work every day, they now have a functional workspace with an adequate communications infrastructure to efficiently work vehicle and cargo integration projects. Their short commute takes them past historic sites such as Gagarin and Korolev's former homes. The launch pad that was used to launch

Sputnik, the first Russian ICBM, and Gagarin into space is also on the way. Occasionally, a camel or a pack of wild dogs may greet them on the way to their new office. ■

Carlos Fontanot is on a one-year assignment in Moscow for the Public Affairs Office.

"We have a lot of work to do in preparation for a very busy flight schedule and a lot to learn from our Russian colleagues in Baikonur."

— Dave Lengyel

Hubble

Continued from Page 1

Foale has space-walking experience both outside the shuttle and Russia's Mir space station. But a Hubble servicing mission is one Foale had in mind long before his trip to Mir.

"I'm realizing a dream," he says, adding that this fulfills "a desire to go and visit the Hubble Space Telescope and do the EVA – to see the telescope in all its glory and also see the Earth from very high up."

Hubble orbits at nearly the highest point reachable by the shuttle at nearly 350 miles.

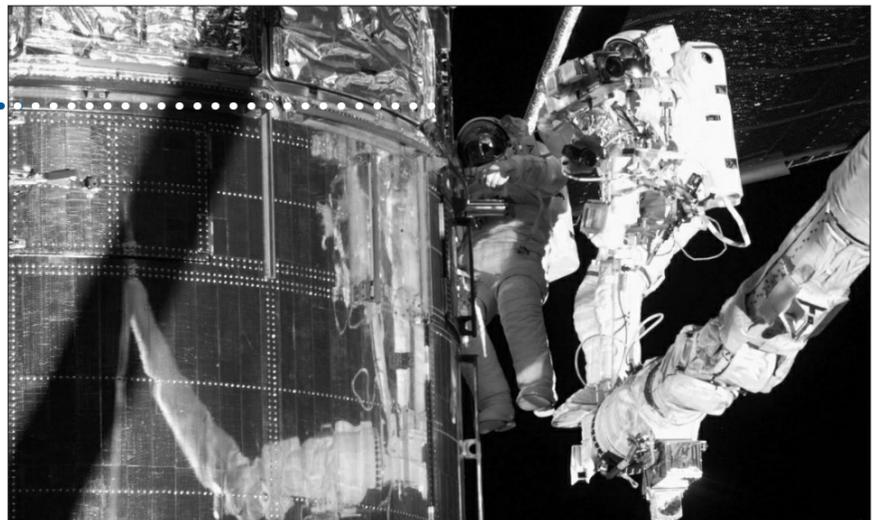
On the third space walk, Smith and Grunsfeld will venture out once again to perform tasks, including replacing a transmitter; swapping a reel-to-reel tape recorder with a solid state recorder; and installing protective insulation on the 'hot' side of the telescope which has deteriorated from the effects of the harsh space environment.

The last space walk has Foale and Nicollier heading out to apply some more protective insulation on the upper portion of the telescope almost exactly like wallpaper. They also will place protective covers around some flaking handrails.

Nicollier, performing his first-ever space walks, has seen the telescope up close – albeit from inside as the primary robot arm operator back in 1993.

"Hubble is very close to my heart and going back... is really a great privilege for me," Nicollier says.

Once the mission is over and the stillness of space envelopes Hubble once again, observations will resume until the next visit of a shuttle for further maintenance tasks in 2001. On that flight a new set of high-performance solar arrays will be installed in similar fashion to what was



NASA Photo 82e5718

STS-82 astronauts Steve Smith and Mark Lee service the Hubble Space Telescope.

done on the first servicing mission. Also, a new Advanced Camera for Surveys will be installed as will a cooling system for other science instruments.

But for now, Hubble waits patiently for its first visitors in nearly three years, and continues to make itself available to astronomers around the world who have the knowledge and imagination that made such a spacecraft possible in the first place. ■

JSC and CCISD celebrate SciAd kickoff



By Nicole Cloutier

JSC and CCISD have begun phase one of the Science Advisor (SciAd) Program and due to an overwhelming response to Center Director George Abbey's call for volunteers, have already expanded the program. More than 100 JSC employees signed up to be SciAds, causing organizers to add all eight CCISD intermediate schools to the program.

"Initially, we only planned to have SciAds at the 18 CCISD elementary schools the first year," said Susan Braymer, SciAd Steering Committee chair and deputy director of Human Resources. "But due to the wonderful response from JSC employees, we were able to expand the scope of the SciAd Program and provide assistance to more schools."

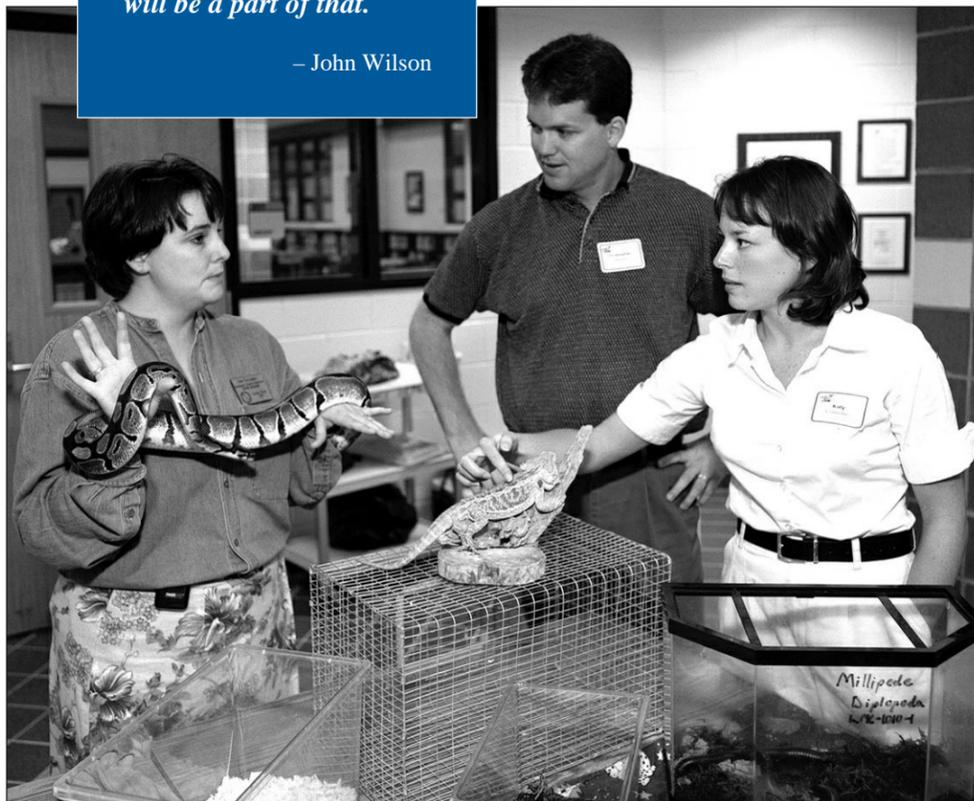
Eight intermediate schools and all 18 elementary schools are now participating in the SciAd Program. Organizers plan to incorporate all four CCISD high schools next year and include several other school districts in the area. "We also are hoping to involve the contractor community in the next phase of the program," said Braymer.

To kick off the program with CCISD, SciAd recently hosted a team building session for the SciAds to meet their respective teacher liaisons, known as STARS. After an introduction from Abbey and CCISD Superintendent John Wilson, the STARS and SciAds paired up for a hands-on activity and then were able to peruse educational resource exhibits.

Although the program provides a lot of flexibility for the STARS and SciAds, one of their first objectives

Education is about experience. And the more quality experiences we can put in front of our young people, the better their opportunities are. I think the SciAd project will be a part of that.

— John Wilson



Deb Pavlosky from the Seabrook Science Resource Center shows SciAds "live" resources for hands-on science projects.

will be preparing for an upcoming LEGO® Robotics Competition. Each elementary school is developing a student team to participate in the early December competition. The SciAds will be a big asset to the teachers in helping the teams prepare.

"Having a degree in elementary education is a lot different than building robots," said Dee Rozenburg, a fourth grade teacher from McWhirter Elementary School, who said she was very excited to hear that JSC staff would be helping them with the robotics project.

"Helping the teachers with hands-on projects and demonstrations will be a large part of our role," said Winston Goodrich, SciAd and aerospace engineer in the Engineering Directorate. Goodrich said in his many years with NASA he's participated in numerous other volunteer calls such as science fair judging or talking to classes, but he feels this program will be different. "I think having the continuity for the teachers and the students is the key to this program.

Most of us have done these types of things before on a smaller or shorter scale, maybe a once a year visit, but nothing that entailed this kind of commitment. I'm really looking forward to it."

School administrators are enthusiastic as well and anticipate positive results for the students.

"Education is about experience," said Wilson. "And the more quality experiences we can put in front of our young people, the better their opportunities are. I think the SciAd project will be a part of that."

The SciAd Program, which was launched by the White Sands Test Facility in 1990, provides JSC employees as resources to the local schools. Each SciAd can dedicate eight hours a month, of paid time, to the program. The SciAds are available to the school's teachers to help in a variety of capacities – including helping the teachers plan hands-on activities, lab equipment setup or coming to the class to help with a demonstration or experiment. More information is available at:

<http://hro.jsc.nasa.gov/sciad/>. ■

Co-ops design robots for use in classrooms

When NASA-JSC and the Clear Creek Independent School District kicked off the new Science Advisor (SciAd) Program October 18 at Space Center Intermediate School, three LEGO® robots stole the show. The machines were designed, built and programmed by three teams of JSC co-ops.

"Last August, it was determined that the Clear Creek Independent School District science program for the academic year 1999-2000 would include a LEGO® robotic competition at all CCISD elementary schools," said Rick Barton, NASA chief of the Aeroscience Branch and lead of the SciAd Resources Team, which is responsible for developing hands-on technical activity kits for the SciAds to use in their classroom demonstrations. "The issue for the Resources Team was to determine how to train all the JSC SciAds on how to use LEGO® materials."

The idea was to enlist the enthusiasm and innovation of the co-ops to build and program LEGO® robots, which would subsequently be used by the teachers and SciAds to prepare the students for their upcoming competition.



TEAM 1 MEMBERS, from left, are: Javier Goas, Josh Krakos, Jessica Badger, Aaron Brunner and Lucie Johannes. Not pictured: Jeffrey Davis.

To initiate the plan, three teams of co-ops participated in a competition of their own, using commercially available kits to build their robots. They were able to build whatever they wanted, the only rule being that they could not purchase additional LEGO® parts.

Team 1 built a LEGO® machine that senses inclines. The team felt that if the robot were exploring unfamiliar terrain such as Mars, it might encounter inclines. As a result of such an encounter, it might flip over. As it was programmed, the robot senses the potentially dangerous incline, stops and backs up, turns, and approaches the same incline again from a different angle. In addition, a pressure sensitive shovel on the front end of the machine can be used to move debris out of its way.

Team 2 built a robot that may be usable on Mars. The team devised a robot, called the Mars Smart Grabber, which looks for items and, upon finding them, decides whether or not to pick them up. If it decides to do so, it picks them up and moves them to a certain area.

The robot moves around and stops when a touch sensor indicates that it has run in to something. A sensor then reads the reflection of light off of whatever object it is viewing. The lower the

amount of light that is reflected, the greater the chance that the robot will grab the object. Two motors run the robot.

Team 3 produced a robot that winds its way through a maze by constantly turning right. If the robot runs in to a wall, a touch sensor under the front bumper tells it that an obstruction is ahead. One motor runs each of the machine's wheels. Once it reaches the end of the adjustable maze, the robot plays a victory song.

Team members received JSC GEM or "Go the Extra Mile" Awards for their support of the SciAd Program during a special ceremony held at the center.

"From the very beginning of this program, we have had wonderful support from the co-ops," said Susan Braymer, SciAd Steering Committee chair and deputy director of Human Resources, following the awards presentations. "On behalf of the center, I want to thank each of the co-ops for their help in making the SciAd Program so successful."

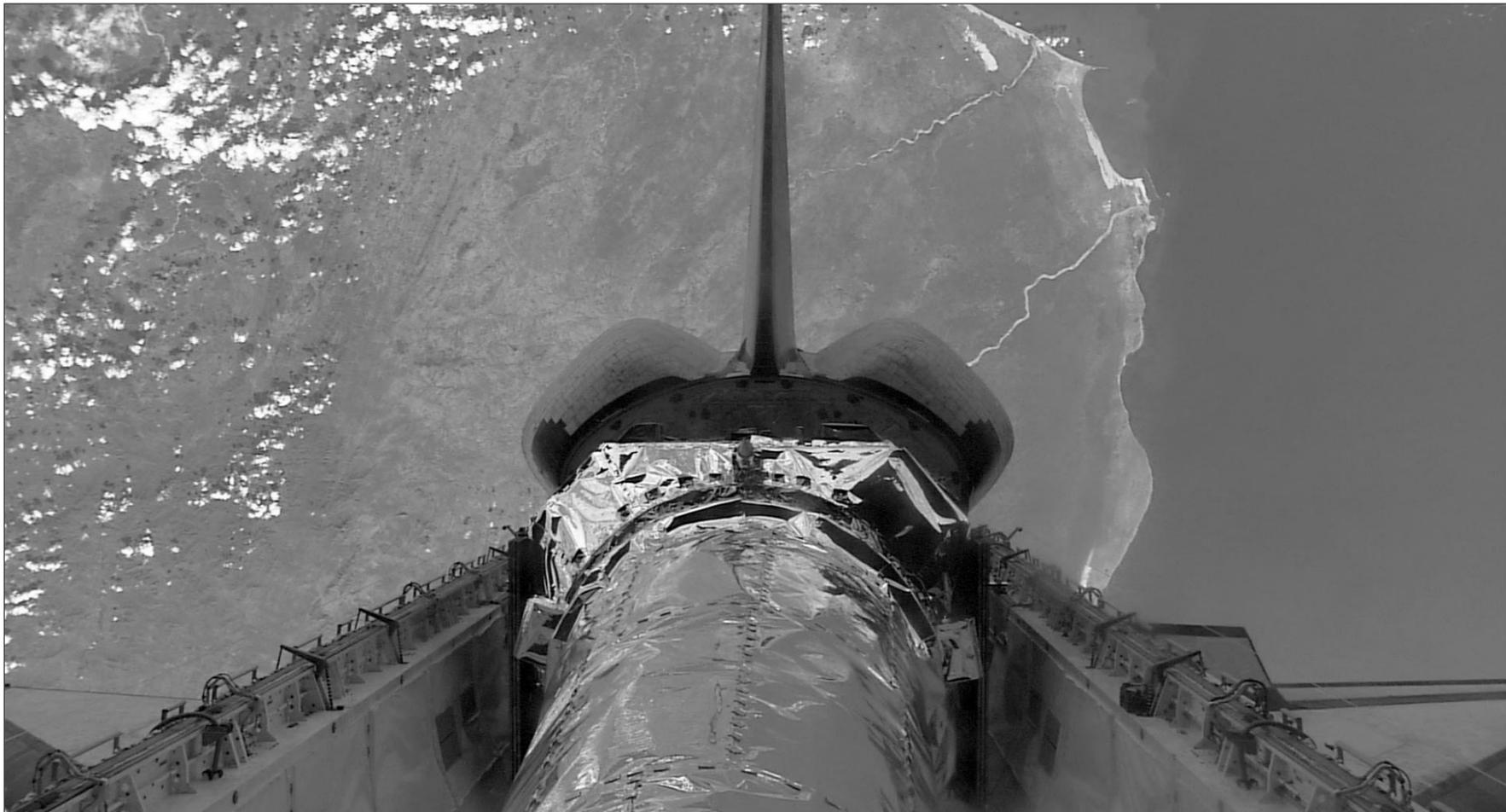
A cooperative effort between JSC and CCISD, the SciAd Program links volunteers and educators for the improvement of science education. ■



TEAM 2 MEMBERS, from left, are: Olivier Deigni, Tiffany Richardson, Kay Standridge, Phil Strawser, Alisa Hawkins, Marcia Holman and Rey Guerra.



TEAM 3 MEMBERS, from left, are: Jen Sheppard, George Tuan, Jon Lenius, Adam Milstein, Ben Hargis, Matt McCurdy, and Todd Nadeau.



HDTV's remarkable clarity and crispness will help scientists gather more information from its improved Earth imaging. Some scientists say the current standard video equipment appears "out of focus" when compared to HDTV views such as the one above.

Sharper image comes to JSC: *HDTV brings new images of space*

By Nicole Cloutier

High definition television, also known as HDTV, is changing the way we see space.

As a detailed test objective (DTO) on STS-93, an HDTV camcorder (on loan from Sony as part of a Space Act Agreement) was used to capture the Chandra deployment on tape, Earth observations and in-cabin activity. HDTV camcorders were at KSC to cover *Columbia's* launch and landing, activities during the mission in MCC, and the STS-93 pre-mission training. Although the improved quality of the footage was remarkable in itself, when image analysts were able to use post-flight footage to help identify hydrogen leak sites on the booster engine bells, HDTV's capabilities really came to light.

"It's amazing," said Mike Lee, Hernandez Engineering scientist with the Image Science and Analysis Group. As part of the DTO, Lee compared post-flight images in HDTV format with NTSC (our normal television format) footage but the outcome surpassed his expectations. "The HDTV imaging is so much more impressive — there's really no comparison. It's almost better than being there yourself seeing it with the naked eye because HDTV allows you to zoom in on minute details."

HDTV is a subset of digital television (DTV) and brings with it a new level of broadcast efficiency and quality. The U.S. DTV standard can broadcast multiple video channels with improved quality in the same bandwidth now occupied by the current analog NTSC format. The improved technology is demonstrated by remarkable image clarity, several times better than the analog systems commonly used today.

"We're able to achieve significant improvement in image quality not previously possible," said Doug Holland, JSC's lead project engineer for HDTV. "This technology will enable us to fulfill new mission objectives and allow us to improve our abilities to perform existing mission requirements."

For STS-93, the primary objectives were to test and demonstrate the HDTV format as an engineering and inspection tool as well as its capability to perform Earth observations. To that end, meticulous detail and picture crispness was critical. A large portion of the success of HDTV on STS-93 was due to the exceptional performance by the two crewmembers assigned to HDTV, Cady Coleman and Jeff Ashby.



In preparation for an STS-93 DTO, astronauts Jeff Ashby, pilot, and Cady Coleman, mission specialist, train with a high-definition television camcorder.

This crew took a personal interest in making the most out of this flight project.

"After seeing HDTV, NTSC footage almost looks like it's out of focus," said Eric Nielsen, Video Digital Analysis Systems (VDAS) Lab manager also with Hernandez Engineering. Nielsen works with Lee, where they regularly assess launch and landing video for anomalies. "The difference is like night and day. Looking at HDTV, you see can see details of objects that are not visible in the NTSC images."

Analog systems tend to lose quality when they are transmitted or recorded, while digital systems, such as HDTV, can

be recorded or transmitted without loss in quality.

"Each time you record from an analog NTSC source onto any of the common analog tape formats such as VHS, you lose signal quality and integrity," said Holland. "After a few generations, the quality has degraded to an unusable level, especially for our needs. But with DTV formats like HDTV, you can copy as

were made available to Lee and Nielsen here in Houston for analysis.

"The HDTV footage really helped us on this flight during the post-landing walk around," said Nielsen. "Our primary interest during the walk around was to have a view of the engine bell showing the area of the suspect leak. The NTSC views showed the discoloration and spray pattern caused by the leak, but it was not until we viewed the HDTV images that three perforations became visible. These were the first views of the damage provided to JSC."

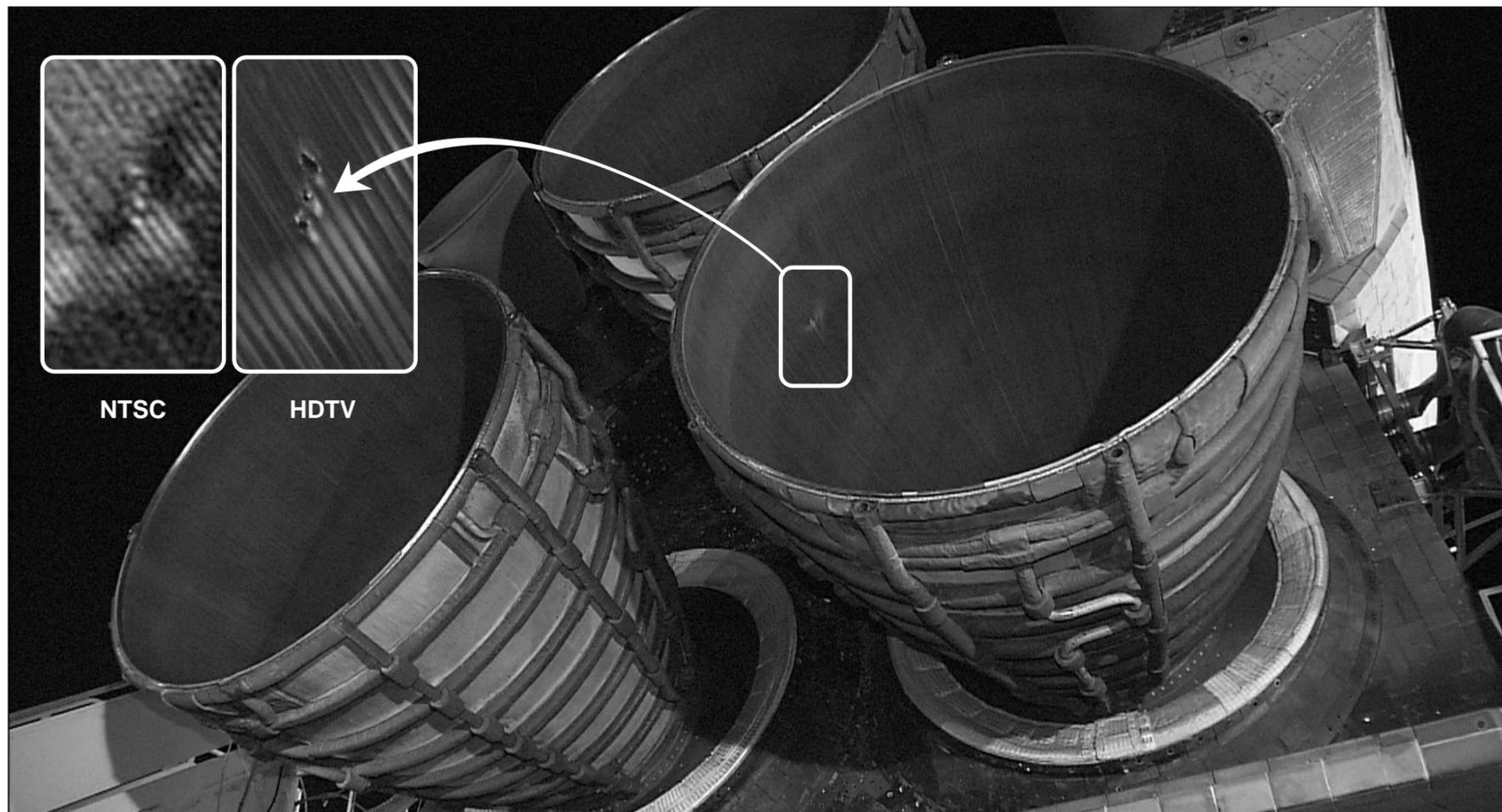
In addition to helping organizations who rely on video, HDTV is also very promising for regular users of still film photography. Julie Robinson, Lockheed Martin senior scientist in the Office of Earth Sciences, also depends on visuals from space to conduct her job analyzing Earth images. Her team collects photos from every shuttle mission which are used to map natural environments and to study changes in land use such as deforestation and urban sprawl.

"Film cameras have been the standard for our purposes," said Robinson. "Use of video hasn't even been an option until now."

Robinson says the lack of resolution with standard NTSC video cameras eliminates the possibility of using standard video products for her studies. However, they conducted side-by-side assessments of the HDTV footage with standard photos from STS-93 and are excited about the results.

"Although film still provides better resolution and larger fields-of-view, HDTV presents a useful complement to film, and offers some advantages," Robinson added.

One characteristic they noticed immediately with HDTV was color accuracy. Film is manufactured and developed to respond to sunlight on Earth, but sunlight in the orbital environment has different characteristics. Photographic images come back off-color and usually have to be corrected in the lab. HDTV captures the color true-to-life.



STS-93 image analysts were able to use post-flight HDTV footage to help identify hydrogen leak sites on the main engine bells, shown in inset compared to NTSC image.

"HDTV color is excellent," said Robinson. "We could tell a difference immediately – it has less of a 'bluish tint' than normal film. We asked the crew and they told us that the HDTV images better reflected how Earth looked from space."

Robinson says the subtle color differences aid scientists in distinguishing natural features, such as forests, reefs and lagoons.

"We're very optimistic," said Robinson. "We'll be able to integrate this information with other satellite imaging technologies, such as Landsat and SeaWiFS (Sea-viewing Wide Field-of-view Sensor). HDTV will really complement our scientific studies."

According to Robinson, one major disadvantage is that NASA does not currently have the necessary editing equipment to extract still images from the HD video. Still images for this DTO were extracted at the NHK (Japan Broadcasting

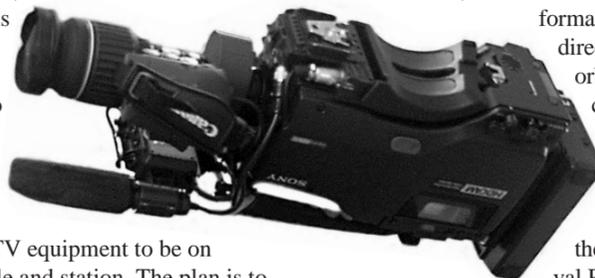
Corporation) editing studios in Japan as part of a collaborative agreement.

All of the benefits achieved so far have been realized by use of the HDTV camcorder alone. The DTV team, made up of Doug Holland, Ken Fisher, Johnnie Reid, Glenn Steele, Vic Studer, Richard Coles, Scott Billups, and others is developing integration hardware to enable commercial-off-the-shelf (COTS) DTV equipment to be on board shuttle and station. The plan is to take an incremental approach, phasing in DTV equivalents of existing analog NTSC components.

The first phase of the implementation called configuration 1, currently scheduled

to fly on STS-102, will incorporate a COTS DTV tape recorder (VTR), a DTV camcorder, and a downlink multiplexer.

"We chose DVCAM format for the in-flight recorders because the equipment has advantages such as small size, weight, and power, but has close to professional performance," said Fisher. "Because this



format does not directly save the orbiter's closed-circuit TV telemetry, we developed a unique interface box called the Vertical Interval Processor (VIP)

that will allow us to store this information using the un-modified VTR. The VIP also provides additional circuitry to allow interfacing of the audio, video and power from the orbiter to the VTR."

Configuration 1 will allow users to capture, record, and downlink high quality standard definition video without ever leaving the digital domain. The DVCAM camcorders are destined to replace the ailing Hi-8mm analog camcorders that have been the standard in-flight camcorders for more than 10 years. The digital downlink multiplexer (MUX) will allow up to four simultaneous video sources to be downlinked through the shuttle Ku-band system using the same channel that is now required to downlink one analog TV signal. The MUX will also provide a common interface for the shuttle and space station communications systems.

The next configuration to be incorporated on STS-105 will include an HDTV camcorder and a compression encoder that allows the world to see for the first time high definition TV live from space. ■



The DTV team, from left, including Richard Coles, Glen Steele, Ken Fisher and Doug Holland, is developing integration hardware to enable commercial-off-the-shelf DTV equipment to be on board shuttle and International Space Station.

NASA JSC Photo S99-12250 by Benny Benavides

Ripped from the ROUNDUP

Ripped straight from the pages of old Space News Roundups, here's what happened at JSC on this date:

1 9 6 4

The blackened interior of a long, high ceilinged building here at the Manned Spacecraft Center is where the astronauts will work to perfect the docking maneuver of two vehicles in space before they try it for real on one of the upcoming Gemini orbital flights.

Known as the Translation and Docking Simulator (TDS), the trainer, located in Building 260, simulates all the motions required to dock an actual Gemini spacecraft and Agena vehicle in space.

It has been designed to simulate the responses to the thrust of the Gemini Orbit Attitude and Maneuver System (OAMS) thrusters, which will move the vehicles in orbit.

1 9 6 9

MSC Director Robert R. Gilruth commended the people and machines which made the Apollo 12 flight as "a magnificent crew, superb performance."

At a post-recovery press conference Dr. Gilruth said, "I would just like to express my profound admiration for the magnificent crew that accomplished all the objectives in this our most difficult mission yet."

Press inquired about some aspects of the flight which did not go according to plan. Some of the events which might have seemed to be mishaps actually gave the planners confidence for future missions. Conrad's spill, for example, gave reassurance about crew members' ability to handle themselves in adverse circumstances on the lunar surface.

1 9 7 4

Five years ago (Nov. 19, 1969), two American astronauts placed and left on the moon a remote scientific instrument package. Five years later and over 21,000 Earth-to-moon commands later, this set of instruments continues to respond with data about the moon's seismic activity, the energy hitting the surface from the sun and the moon's weak magnetic field.

Original specifications for the Apollo Lunar Scientific Experiment Package or ALSEP 12 called for the instruments to last for one year after the return of Apollo 12 astronauts Charles A. Conrad, Alan Bean and Richard Gordon.



JSC Chapter of Alumni League contributes to NASA College Scholarship Fund



NASA JSC Photo S99-12818 by James Blair

Attending the check presentation, from left, are: Brewster Shaw (Alumni League), Mary O'Connell (Scholarship Committee), Doug Ming (Scholarship Committee), Guy Thibodeaux (Alumni League), Jim Jaax (Scholarship Board), Teresa Sullivan (President, Scholarship Fund), Norm Chaffee (Alumni League), Greg Hayes (Chairman, Scholarship Board), George Abbey (JSC Director), Chet Vaughan (President, JSC Chapter of the NASA Alumni League), Vernon Shields (Alumni League), Nancy Robertson (Scholarship Board), Lonnie Jenkins (Alumni League), Michael Richardson (Scholarship Board), and John Kemp (Vice President, Scholarship Fund).

Chester Vaughan, Brewster Shaw, Guy Thibodeaux, Norm Chaffee, Lonnie Jenkins, and Vernon Shields of the JSC Chapter of the NASA Alumni League presented a check for \$10,000 to George W. S. Abbey, JSC center director, and to Gregory W. Hayes, chairman of board of directors of the NASA College Scholarship Fund, Inc. This is the fourth contribution that the JSC Chapter has made to the Scholarship Fund and brings

its total contributions to \$50,000 since 1991. As Vaughan said, "It's the gift that keeps on giving to the NASA family."

Since the Scholarship Fund was originally endowed in 1982 by noted Pulitzer Prize-winning author James A. Michener, 84 scholarships have been awarded to dependents of NASA employees across the agency (15 of these have been dependents of JSC employees). These have been made possible because

of contributions from the JSC Chapter of the Alumni League, the Freedom Forum, and NASA employees who have contributed through the Combined Federal Campaign.

Six scholarships will be awarded next year. Each scholarship is for \$8,000 over a six-calendar-year period. Further information about the Scholarship Fund may be obtained from Teresa R. Sullivan at x31034. ■

Children participate in Halloween parade



FALL CARNIVAL COSTUME PARADE—On October 29, Information Systems Directorate sponsored the first annual Fall Carnival Costume Parade for the JSC Child Care Center. Three groups of children, approximately 45 in all, paraded through Bldgs. 1, 2, 12, 8, 7, and 4, ending at the Bldg. 3 cafeteria. Employees dressed in Halloween costumes gave treats to the parading children as they passed through each of the buildings. The children stored their treats in bags emblazoned with the NASA logo.

TICKET WINDOW

Exchange Store hours

Monday-Friday
Bldg. 3 7 a.m.-4 p.m.
Bldg. 11 9 a.m.-3 p.m.

All tickets are nonrefundable.
Metro tokens and value cards are available.
Franklin Planners now available.
For more information, please call x35350.

The following discount tickets are available at the Exchange Stores

General Cinema Theaters	\$5.50
Sony Loew's Theaters	\$5.00
AMC Theaters	\$4.75
Moody Gardens (2 of 6 events) (does not include Aquarium Pyramid)	\$10.75
Moody Gardens (Aquarium only)	\$9.25
Sea World	adult .. \$27.25 child (age 3-11) .. \$18.25
Space Center Houston	adult .. \$10.25 child (age 4-11) .. \$6.50 (JSC civil service employees free.)
Space Center Houston annual pass	\$18.75
Entertainment Books	\$20.00

November 25

Thanksgiving Day Parade reserved seating	\$16.00
Rockets Tickets available in Bldg. 11	
Sweet Water pecans for holiday baking	\$6.00

Please bring your driver's license to pay by personal check.

JSC honors inventors for outstanding work on behalf of center



Attending the annual JSC Inventors Luncheon are, from left, front: Gregory S. Aber, Jane T. Malin, George A. Salazar, and James W. Akkerman; back: Edward K. Fein, William C. Schneider, G. Dickey Arndt, Charles E. Verostko, Dennis R. Morrison, David A. Wolf and George W. S. Abbey.

Fifteen current and former JSC employees were honored recently at the annual JSC Inventors Luncheon at the Gilruth Center.

Patent counsel Ed Fein presented this year's awards. JSC Director George W.S. Abbey commended the honorees for their outstanding work on behalf of the center, the space program and the nation.

Those honored this year were Gregory S. Aber, James W. Akkerman and Richard J. Bozeman Jr. of Engineering for their

Axial Pump; Jane T. Malin of Engineering for her Global Qualitative Flow-Path Modeling for Local State Determination in Simulation and Analysis; William C. Schneider of Engineering for his Method and Apparatus for Coupling Space Vehicles; Richard J. Bozeman Jr. of Engineering for his Accelerometer Method and Apparatus for Integral Display and Control Functions; Joel M. Stoltzfus of the White Sands Test Facility for his Method and Apparatus for Production of Powders; G. Dickey Arndt of

Engineering for his Particle Velocity Measuring System; Richard D. Juday of Engineering for his Apparatus and Method for Focusing a Light Beam in a Three-Dimensional Recording Medium by a Dynamic Holographic Device.

Also honored were Dena S. Haynes and George A. Salazar of Engineering for their Real-Time Reconfigurable Adaptive Speech Recognition Command and Control Apparatus and Method; Charles A. Verostko of Engineering for his Fiber-Optic

Chemiluminescent Biosensors for Monitoring Aqueous Alcohols and Other Water Quality Parameters; Steven L. Koontz of Engineering for his Distributed Pore Chemistry in Porous Organic Polymers; Dennis R. Morrison of Space and Life Sciences for his Microcapsules and Methods for Making; Glenn F. Spaulding of Space and Life Sciences and David A. Wolf of Flight Crew Operations for their Cultured High-Fidelity Three-Dimensional Human Urogenital Tract Carcinomas and Process. ■

Safety & Total Health Day

Bad choices can last a lifetime – *if you live*

By Mary Peterson

He's an emergency room doctor. He's used to seeing trauma and injury – or should be. But one girl in particular made him cry.

She was young. She had her whole life before her when a tragic automobile accident changed everything.

She was left a paraplegic, and her world closed in, proportionate to her diminished body. "What," asked the doctor, "is the most difficult thing?" Without hesitation, she said, "The wheelchair. I look at my twin sister, and I see myself. I see the things she can do that I cannot."

The doctor was Dr. Robert Conn, one of Canada's most celebrated children's cardiovascular surgeons, and keynote speaker at JSC's Safety & Total Health Day event this year. His message: life should be happy and fun, but it is not without risk. How you manage that risk can make a difference, and bad choices can last a lifetime – if you live.

What are good choices? They can be as simple as buckling your seat belt, not drinking and driving, not taking drugs, not diving into unfamiliar waters, and wearing a crash helmet and other safety gear appropriate to your activity, just to name a few.

Conn told how he left medical practice six years ago to become a crusader for safer



Robert Conn

living. "I had always wanted to be a doctor, and part of my training was done in Atlanta with the organ harvest team. I never stopped to think where the hearts came from. They were donors – much like everyone in this room," he told the audience, "but, injured – brain damaged, and I thought, 'it didn't have to happen.' I came to the point I

couldn't stomach taking hearts out of people who should not be dead." This was the genesis of what would become his very successful SmartRisk Foundation based in Toronto, Ontario, Canada, and dedicated to accident prevention.

But, how do you get people to buy into safety? "If you asked most people what they thought was the number one cause of death," Conn said, "they would likely respond 'cancer,' then, 'heart.' But the actual

number one cause of death is injury. Young people, ages 1–20, are more likely to die of injury than from all other diseases combined." They are called accidents, "an unavoidable act of fate," the dictionary says. Conn agrees with neither, believing all accidents are predictable and preventable. "Mostly," he says, "they're the result of bad choices." For these reasons, he fervently believes that risk management should become a social issue, patterned much after the successes of the fitness and environmental movements.

A point made by Conn was that the media contributes to the public's frame of thinking. "For example," he said, "six young girls were in a car wreck, three of whom were decapitated, and the headlines read, 'Three Young People Die in Car Accident,' yet," he continued, "should three people die of meningitis or some other frightening disease, it would be a big story and would create public outcry." Why? Because people feel this is something out of their control. Prevention, cures, vaccines, therapies, etc., would suddenly be in big demand. Accidents, on the other hand, happen to "other people." Even the terms we use remove personal responsibility: "the car went out of control," or "the car flipped over."

Much of this kind of thinking is changing, however – at least among many Canadian young people. SmartRisk created a traveling roadshow that features some 7,000 pounds of high-tech audio/video equipment and addresses 400 young people at a time. It shows the painful difference between young people having a good time as contrasted with kids in wheelchairs and spinal cord units. The show is not designed to scare or preach, but, rather, to elicit a strong emotional reaction. It does. Most important, it teaches young people that they are in control and they make their choices.

SmartRisk has also entered into television communications, having made some gripping public service announcements, two of which were shown to the audience. One particularly poignant example was inspired by the alarming rise in boating deaths among young men, 19–35, and occurring less than 100 feet from shore. The usual cause was not wearing a life jacket. How

could they reach this age group with their message? A study revealed that 80 percent had children. This could be the answer.

Lights dimmed, and the opening shot was a close-up of two young girls, about 4 and 5, wearing lifejackets themselves and sitting in a small fishing boat. The camera pulled out to discover they were alone in the vessel, rocking, rocking, silently and alone. A longer camera shot revealed an empty life jacket floating in the water. The voice over said, "They didn't really need you anyway."

The response, according to Conn, has been incredible. Most, he said, were worried about what would happen to the kids. Who would rescue them?

In addition to recognizing the choices of smart risk, Conn urges safety training. "Most people who get hurt," he says, "are not properly trained." Being trained in first aid can reduce injury risk by 30 percent. If you are trained, you know accidents don't just happen, Conn maintains.

Interestingly, when a famous celebrity dies, much is said as to what should have been done to prevent it. Conn cited actor John Candy, dead too young of a heart attack. "And, Diana, Princess of Wales. We read much about the paparazzi, the speed, and the alcohol, but not about the choice that Diana made that night," he said. "She was not wearing a seat belt. When the crash stopped the car, the momentum of her own body could not be stopped. It kept going, and because she did not have a seat belt, all her internal organs were damaged. You will remember the only survivor was the man in the front seat wearing a seat belt. Much was made of the speed and the alcohol – but we don't talk about safety." ■

DATES & DATA**November 22**

Alzheimer's support group meets: The Clear Lake Alzheimer's Caregiver Support Group will meet at 7:30 p.m. to 9 p.m. November 22 in the first floor conference room, St. John Hospital West building, Nassau Bay. For additional information, contact Nancy Malley at (281) 480-8917 or John Gouveia (281) 280-8517.

November 24

Astronomy seminar: The JSC Astronomy Seminar Club will meet at noon November 24 and December 1, 8 and 15 in Bldg. 31, Rm. 248A. For details call Al Jackson at x35037.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. November 24 and December 1 and 8 at United Space Alliance, 600 Gemini. For additional information call Patricia Blackwell at (281) 280-6863.

November 29

AIAA seeks engineers: AIAA seeks engineers to support school visits during Engineers Week, February 21-25, 2000. If you would like to talk with some students about what it's like to be an engineer or to work with NASA, then contact Joy Conrad by November 29, 1999, at jconrad@averstar.com.

December 2

Communicators meet: The Clear Lake Communicators, a Toastmasters club, will meet at 11:30 a.m. December 2 and 9 at Freeman Library, 16602 Diana Lane. For details, call Allen Prescott at (281) 282-3281 or Mark Caronna at (281) 282-4306.

Warning System Test: The site-wide Employee Warning System will perform its monthly audio test at noon December 2. For additional information, call Bob Gaffney at x34249.

December 3

Chess club meets: Space City Chess Club will meet from 5 p.m. to 9 p.m. December 3 at the Clear Lake Park Meeting Room. Beginners are welcome. Visitors should bring their own chess sets and boards.

December 6

NSBE meets: The National Society of Black Engineers will meet at 6:30 p.m. December 6 at Texas Southern University, School of Technology, Rm. 316. For additional information, call Kimberly Topps at (281) 280-2917.

December 7

Quality Society meets: The Bay Area Section of the American Society for Quality will meet at 6 p.m. on Tuesday December 7 at the Ramada King's Inn on NASA Road 1. No reservations are required. For additional information, contact Ann Dorris at x38620.

December 8

IAAP meets: The Clear Lake/NASA Chapter of the International Association of Administrative Professionals (formerly Professional Secretaries International) will meet at 5:30 p.m. December 8 at Bay Oaks Country Club. Cost is \$16. For additional information and reservations, call Tami Barbour at (281) 488-0055, x238.

December 9

Airplane club meets: The Radio Control Airplane Club will meet at 7 p.m. December 9 at the Clear Lake Park building. For more information call Bill Langdoc at x35970.

MAES meets: The Society of Mexican-American Engineers and Scientists will meet at 11:30 a.m. December 9 in Bldg. 16, Rm. 111. For additional information, call George Salazar at x30162.

December 12

Westside NSS meets: The Westside group of the Clear Lake area chapter of the National Space Society will meet at 2 p.m. December 12 at Silicon Graphics, 11490 Westheimer, Suite 100. For details, call Murray Clark at (281) 367-2227.

December 14

Aero Club meets: The Bay Area Aero Club will meet at 7 p.m. December 14 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information call Larry Hendrickson at x32050.

CLA-NSS meets: The Clear Lake area chapter of the National Space Society will meet at 6:30 p.m. December 14 at the Freeman Memorial Branch Library, 16602 Diana Lane. For more information call Murray Clark at (281) 367-2227.

NPMA meets: The National Property Management Association will meet at 5 p.m. December 14 at Robinette and Doyle Caterers, 216 Kirby in Seabrook. Dinner costs \$14. For more information call Sina Hawsey at x36582.

GILRUTH CENTER NEWS

<http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm>

Hours: The Gilruth Center is open from 6:30 a.m.-10 p.m. Monday-Thursday, 6:30 a.m.-9 p.m. Friday, and 9 a.m.-2 p.m. Saturday. Contact the Gilruth Center at (281) 483-3345.

Sign up policy: All classes and athletic activities are on a first-come, first-served basis. Sign up in person at the Gilruth Center and show a yellow Gilruth or weight room badge. Classes tend to fill up two weeks in advance. Payment must be made in full, cash or by check, at the time of registration. No registration will be taken by telephone. For details call x33345.

Gilruth badges: Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday and 9 a.m.-2 p.m. Saturdays. Cost is \$10. Dependents must be between 16 and 23 years old.

Nutrition intervention program: Six-week program includes lectures, a private consultation with the dietitian and blood analysis to chart your progress. Program is open to all employees, contractors and spouses. For details call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month at the Gilruth Center. Pre-registration required. Cost is \$25. Call for next available class.

Stamp club: Meets every second and fourth Monday at 7 p.m. in Rm. 216.

Weight safety: Required course for employees wishing to use the Gilruth weight room. Pre-registration is required. Cost is \$5. Annual weight room use fee is \$90. The cost for additional family members is \$50.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

Step/bench aerobics: Low-impact cardiovascular workout. Classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32 for eight weeks. Kristen Taragzewski, instructor.

Yoga: Stretching class of low-impact exercises designed for people of all ages and abilities in a Westernized format. Meets Thursdays 5-6 p.m. Cost is \$32 for eight weeks. Call Darrell Matula, instructor, at x38520 for more information.

Ballroom dancing: Classes meet Thursdays from 6:30-7:30 p.m. for beginner, 8:30-9:30 p.m. for intermediate and 7:30-8:30 p.m. for advanced. Cost is \$60 per couple.

Country and western dancing: Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health-related fitness program includes a medical screening examination and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

Aikido: Martial arts class for men and women meets 5-6 p.m. Tuesdays and Wednesdays. No special equipment or knowledge is needed to participate. Aikido teaches balance and control to defend against an opponent without using strength or force. Beginning and advanced classes start each month. Cost is \$35 per month.

NASA BRIEFS**NASA UNVEILS NEW MAP OF ANTARCTICA**

For 18 days during the Southern Hemisphere spring of 1997, a NASA-launched Canadian satellite called RADARSAT collected pieces of a puzzle that will help scientists study the most remote and inaccessible part of the Earth — Antarctica. Scientists now have the puzzle pieces put together, forming the first high-resolution radar map of the mysterious frozen continent.

With detail to the point of picking out a research bungalow on an iceberg, the new map has both answered scientists' questions about the icy continent, and left them scratching their heads about what to make of strange and fascinating features never seen before.

"This map is truly a new window on the Antarctic continent, providing new beginnings in our Earth science studies there," said Dr. Ghassem Asrar, Associate Administrator for Earth Science, NASA Headquarters, Washington, DC. The new map was produced as part of NASA's Antarctic Mapping Project.

The most amazing features scientists now see are twisted patterns of ice draining from the ice sheet into the ocean. "We were surprised to see a complex network of ice streams reaching deep into the heart of East Antarctica," said Kenneth Jezek, a glaciologist from the Byrd Polar Research Center at Ohio State University.

Ice streams are vast rivers of ice that flow up to 100 times faster than the ice they channel through, with speeds up to 3,000 feet per year. "There are some extraordinary ice streams in East Antarctica that extend almost 500 miles — nearly the distance along the Mississippi River from New Orleans to Cairo, Illinois," Jezek said. Ice streams form the most energetic parts of the Antarctic ice sheet, and scientists believe that they are quite susceptible to environmental change. Ice streams also transport most of the snow that falls on the continent's interior and dump it into the ocean.

"We've recently used RADARSAT and other satellite data to estimate that one ice stream system sends over 19 cubic miles of ice to the sea every year — an amount equivalent to burying Washington, DC, in 1,700 feet of ice every 12 months," said Jezek.

Antarctica looks pure, white and mostly featureless to the low-resolution satellites that previously mapped the frozen landscape. With the new RADARSAT map, however, the continent comes alive. Blocks of broken sea ice line the coast and sedimentary rock protrudes from the rocky walls of Antarctica's Dry Valleys. The vast, perplexing Antarctic Ice Sheet flows and twists into the sea, volcanoes poke through the ice sheet and ice streams flow like rivers into the Southern Ocean. Even the tracks of wayward snow tractors on their way to inland stations are visible.

"We have a new view of the entire southern continent. It shows us something about an extraordinary part of our world and how humans may be changing it — on both local and global scales," said Jezek.

SPACE CENTER Roundup

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